AMENDMENTS TO THE CLAIMS

1. **(Currently Amended)** A language model generation and accumulation apparatus that generates and accumulates language models for speech recognition, the apparatus comprising:

a higher-level N-gram language model generation and accumulation unit operable to generate and accumulate a higher-lever N-gram language model that is obtained by modeling each of a plurality of texts as a sequence of words that includes a word string class indicating a linguistic property of a word string constituting two or more words; and

a lower-level N-gram language model generation and accumulation unit operable to generate and accumulate a lower-level N-gram language model that is obtained by modeling a sequence of two or more words within the word string ~~class~~ class,

wherein the word string class further includes a virtual word denoting a beginning of the word string class and a virtual word denoting and end of the word string class.

2. **(Original)** The language model generation and accumulation apparatus according to Claim 1,

wherein the higher-level N-gram language model generation and accumulation unit and the lower-level N-gram language model generation and accumulation unit generate the respective language models, using different corpuses.

3. **(Original)** The language model generation and accumulation apparatus according to Claim 2,

wherein the lower-level N-gram language model generation and accumulation unit includes

a corpus update unit operable to update the corpus for the lower-level N-gram language model, and

the lower-level N-gram language model generation and accumulation unit updates the lower-level N-gram language model based on the updated corpus, and generates the updated

lower-level N-gram language model.

4. **(Previously Presented)** The language model generation and accumulation apparatus according to Claim 1,

wherein the lower-level N-gram language model generation and accumulation unit analyzes a first sequence of words within the word string class into one or more morphemes that are the smallest language units having meanings, and generates the lower-level N-gram language model by modeling each sequence of the one or more morphemes based on the word string class.

5. **(Previously Presented)** The language model generation and accumulation apparatus according to Claim 1,

wherein the higher-level N-gram language model generation and accumulation unit substitutes the word string class with a virtual word, and then generates the higher-level N-gram language model by modeling a sequence made up of the virtual word and other words, the word string class being included in each of the plurality of texts analyzed into morphemes.

6. **(Previously Presented)** The language model generation and accumulation apparatus according to Claim 1,

wherein the lower-level N-gram language model generation and accumulation unit includes

an exception word judgment unit operable to judge whether or not a specific word out of a plurality of words that appear in the word string class should be treated as an exception word, based on a linguistic property of the specific word, and divides the exception word into (i) a syllable that is a basic phonetic unit constituting a pronunciation of the exception word and (ii) a unit that is obtained by combining syllables based on a judgment result, the exception word being a word not being included as a constituent word of the word string class, and

the language model generation and accumulation apparatus further comprises

a class dependent syllable N-gram generation and accumulation unit operable to generate

class dependent syllable N-grams by modeling a sequence made up of the syllable and the unit obtained by combining syllables and by providing a language likelihood to the sequence in dependency on either the word string class or the linguistic property of the exception word, and accumulate the generated class dependent syllable N-grams, the language likelihood being a logarithm value of a probability.

7. **(Previously Presented)** The language model generation and accumulation apparatus according to Claim 1, further comprising

a syntactic tree generation unit operable to perform morphemic analysis as well as syntactic analysis of a text, and generate a syntactic tree in which the text is structured by a plurality of layers, focusing on a node that is on the syntactic tree and that has been selected on the basis of a predetermined criterion,

wherein the higher-level N-gram language model generation and accumulation unit generates the higher-level N-gram language model for syntactic tree, using a first subtree that constitutes an upper layer from the focused node, and

the lower-level N-gram language model generation and accumulation unit generates the lower-level N-gram language model for syntactic tree, using a second subtree that constitutes a lower layer from the focused node.

8. **(Previously Presented)** The language model generation and accumulation apparatus according to Claim 7,

wherein the lower-level N-gram language model generation and accumulation unit includes

a language model generation exception word judgment unit operable to judge a specific word appearing in the second subtree as an exception word based on a predetermined linguistic property, the exception word being a word not being included as a constituent word of any subtree, and

the lower-level N-gram language model generation and accumulation unit generates the

lower-level N-gram language model by dividing the exception word into (i) a syllable that is a basic phonetic unit constituting a pronunciation of the word and (ii) a unit that is obtained by combining syllables, and then by modeling a sequence made up of the syllable and the unit obtained by combining syllables in dependency on a location of the exception word in the syntactic tree and on the linguistic property of the exception word.

9. **(Previously Presented)** The language model generation and accumulation apparatus according to Claim 1, further comprising

a syntactic tree generation unit operable to perform morphemic analysis as well as syntactic analysis of a text, and generate a syntactic tree in which the text is structured by a plurality of layers, focusing on a node that is on the syntactic tree and that has been selected based on a predetermined criterion,

wherein the higher-level N-gram language model generation and accumulation unit generates the higher-level N-gram language model, using a first subtree that constitutes a highest layer of the syntactic tree, and

the lower-level N-gram language model generation and accumulation unit categorizes each subtree constituting a layer lower than a second layer based on a positioning of each subtree when included in the upper layer, and generates the lower-level N-gram language model by use of each of the categorized subtrees.

10. **(Previously Presented)** The language model generation and accumulation apparatus according to Claim 9,

wherein the lower-level N-gram language model generation and accumulation unit includes

a language model generation exception word judgment unit operable to judge, as an exception word, a specific word appearing in any subtree in a layer lower than the second layer based on a predetermined linguistic property, the exception word being a word not being included as a constituent word of any subtree, and

the lower-level N-gram language model generation and accumulation unit divides the exception word into (i) a syllable that is a basic phonetic unit constituting a pronunciation of the word and (ii) a unit that is obtained by combining syllables, and generates the lower-level N-gram language model by modeling a sequence made up of the syllable and the unit obtained by combining syllables in dependency on a position of the exception word in the syntactic tree and on the linguistic property of the exception word.

11. **(Previously Presented)** The language model generation and accumulation apparatus according to Claim 1,

wherein the higher-level N-gram language model generation and accumulation unit generates the higher-level N-gram language model in which each sequence of N words including the word string class is associated with a probability at which each sequence of N words occurs.

12. **(Previously Presented)** The language model generation and accumulation apparatus according to Claim 1,

wherein the lower-level N-gram language model generation and accumulation unit generates the lower-level N-gram language model by associating each of an N-long chain of words constituting the word string class with a probability at which each of the N-long chain of words occurs.

13. **(Currently Amended)** A speech recognition apparatus that recognizes a speech which is a sequence of uttered words, using the following:

a higher-level N-gram language model that is obtained by modeling each of a plurality of texts as a sequence of words that includes a word string class indicating a linguistic property of a word string constituting two more words; and

a lower-level N-gram language model that is obtained by modeling a sequence of two or more words within the word string ~~class~~ class,

wherein the word string class further includes a virtual word denoting a beginning of the

word string class and a virtual word denoting an end of the word string class.

14. **(Currently Amended)** A speech recognition apparatus that recognizes a sequence of uttered words, comprising:

a higher-level N-gram language model generation and accumulation unit operable to generate and accumulate a higher-lever N-gram language model that is obtained by modeling each of a plurality of texts as a sequence of words that includes a word string class indicating a linguistic property of a word string constituting two or more words; and

a lower-level N-gram language model generation and accumulation unit operable to generate and accumulate a lower-level N-gram language model that is obtained by modeling a sequence of two or more words within the word string class, and

the speech recognition apparatus recognizes the speech by use of the higher-level N-gram language model that is accumulated by the higher-level N-gram language model generation and accumulation unit and the lower-level N-gram language model that is accumulated by the lower-level N-gram language model generation and accumulation unit, ~~unit.~~

wherein the word string class further includes a virtual word denoting a beginning of the word string class and a virtual word denoting an end of the word string class.

15. **(Previously Presented)** The speech recognition apparatus according to Claim 14,

wherein the higher-level N-gram language model generation and accumulation unit and the lower-level N-gram language model generation and accumulation unit generate the respective language models, using different corpuses, and

the speech recognition apparatus recognizes speech by use of the higher-level N-gram language model and the lower-level N-gram language model respectively constructed using the different corpuses.

16. **(Previously Presented)** The speech recognition apparatus according to Claim 15,

wherein the lower-level N-gram language model generation and accumulation unit

includes

a corpus update unit operable to update a corpus for the lower-level N-gram language model,

the lower-level N-gram language model generation and accumulation unit updates the lower-level N-gram language model based on the updated corpus, and generates the updated lower-level N-gram language model, and

the speech recognition apparatus recognizes the speech by use of the updated lower-level N-gram language model.

17. **(Previously Presented)** The speech recognition apparatus according to Claim 14,

wherein the lower-level N-gram language model generation and accumulation unit analyzes a sequence of words within the word string class into one or more morphemes that are the smallest language units having meanings, and generates the lower-level N-gram language model by modeling each sequence of the one or more morphemes based on the word string class, and

the speech recognition apparatus recognizes the speech by use of the lower-level N-gram language model that has been modeled as the sequence of the one or more morphemes.

18. **(Previously Presented)** The speech recognition apparatus according to Claim 14,

wherein the higher-level N-gram language model generation and accumulation unit substitutes the word string class with a virtual word, and then generates the higher-level N-gram language model by modeling a sequence made up of the virtual word and other words, the word string class being included in each of the plurality of texts analyzed into morphemes, and

the speech recognition apparatus recognizes the speech by use of the higher-level N-gram language model that has been modeled as the sequence made up of the virtual word and other words.

19. **(Previously Presented)** The speech recognition apparatus according to Claim 18,

wherein the lower-level N-gram language model generation and accumulation unit includes

an exception word judgment unit operable to judge whether or not a specific word out of a plurality of words that appear in the word string class should be treated as an exception word, based on a linguistic property of the specific word, and divides the exception word into (i) a syllable that is a basic phonetic unit constituting a pronunciation of the exception word and (ii) a unit that is obtained by combining syllables based on a result of the judgment, the exception word being a word not being included as a constituent word of the word string class,

the language model generation and accumulation apparatus further comprises

a class dependent syllable N-gram generation and accumulation unit operable to generate class dependent syllable N-grams by modeling a sequence made up of the syllable and the unit obtained by combining syllables and by providing a language likelihood to the sequence in dependency on either the word string class or the linguistic property of the exception word, and accumulate the generated class dependent syllable N-grams, the language likelihood being a logarithm value of a probability, and

the speech recognition apparatus recognizes the speech by use of the class dependent syllable N-grams.

20. **(Previously Presented)** The speech recognition apparatus according to Claim 19,

wherein the language model generation and accumulation apparatus further comprises

a syntactic tree generation unit operable to perform morphemic analysis as well as syntactic analysis of a text, and generate a syntactic tree in which the text is structured by a plurality of layers, focusing on a node that is on the syntactic tree and that has been selected on the basis of a predetermined criterion,

wherein the higher-level N-gram language model generation and accumulation unit generates the higher-level N-gram language model for syntactic tree, using a first subtree that constitutes an upper layer from the focused node, and

the lower-level N-gram language model generation and accumulation unit generates the

lower-level N-gram language model for syntactic tree, using a second subtree that constitutes a lower layer from the focused node, and

the speech recognition apparatus comprises:

an acoustic processing unit operable to generate feature parameters from the speech;

a word comparison unit operable to compare a pronunciation of each word with each of the feature parameters, and generate a set of word hypotheses including an utterance segment of each word and an acoustic likelihood of each word; and

a word string hypothesis generation unit operable to generate a word string hypothesis from the set of word hypotheses with reference to the higher-level N-gram language model for syntactic tree and the lower-level N-gram language model for syntactic tree, and generate a result of the speech recognition.

21. **(Previously Presented)** The speech recognition apparatus according to Claim 20,

wherein the lower-level N-gram language model generation and accumulation unit includes

a language model generation exception word judgment unit operable to judge a specific word appearing in the second subtree as an exception word based on a predetermined linguistic property, the exception word being a word not being included as a constituent word of any subtree ,

the lower-level N-gram language model generation and accumulation unit generates the lower-level N-gram language model by dividing the exception word into (i) a syllable that is a basic phonetic unit constituting a pronunciation of the word and (ii) a unit that is obtained by combining syllables, and then by modeling a sequence made up of the syllable and the unit obtained by combining syllables in dependency on a location of the exception word in the syntactic tree and on the linguistic property of the exception word, and

the word string hypothesis generation unit generates the result of the speech recognition.

22. **(Previously Presented)** The speech recognition apparatus according to Claim 14,

wherein the language model generation and accumulation apparatus further comprises

a syntactic tree generation unit operable to perform morphemic analysis as well as syntactic analysis of a text, and generate a syntactic tree in which the text is structured by a plurality of layers, focusing on a node that is on the syntactic tree and that has been selected on the basis of a predetermined criterion,

wherein the higher-level N-gram language model generation and accumulation unit generates the higher-level N-gram language model, using a first subtree that constitutes a highest layer of the syntactic tree,

the lower-level N-gram language model generation and accumulation unit categorizes each subtree constituting a layer lower than a second layer based on a positioning of the each subtree when included in the upper layer and generates the lower-level N-gram language model by use of each of the categorized subtree, and

the speech recognition apparatus recognizes the speech by use of the higher-level N-gram language model that has been generated using the first subtree and the lower-level N-gram language model that has been generated using each subtree constituting a layer lower than the second layer.

23. **(Previously Presented)** The speech recognition apparatus according to Claim 22,

wherein the lower-level N-gram language model generation and accumulation unit includes

a language model generation exception word judgment unit operable to judge, as an exception word, a specific word appearing in any subtree in a layer lower than the second layer based on a predetermined linguistic property, the exception word being a word not being included as a constituent word of any subtree,

the lower-level N-gram language model generation and accumulation unit divides the exception word into (i) a syllable that is a basic phonetic unit constituting a pronunciation of the word and (ii) a unit that is obtained by combining syllables, and generates the lower-level N-gram language model by modeling a sequence made up of the syllable and the unit obtained by

combining syllables in dependency on a position of the exception word in the syntactic tree and on the linguistic property of the exception word, and

the speech recognition apparatus recognizes the speech by use of the higher-level N-gram language model that does not include the exception word and the lower-level N-gram language model that includes the exception word.

24. **(Previously Presented)** The speech recognition apparatus according to Claim 14,

wherein the higher-level N-gram language model generation and accumulation unit generates the higher-level N-gram language model in which each sequence of N words including the word string class is associated with a probability at which the each sequence of words occurs, and

the speech recognition apparatus comprises

a word string hypothesis generation unit operable to evaluate a word string hypothesis by multiplying each probability at which the each sequence of N words including the word string class occurs.

25. **(Previously Presented)** The speech recognition apparatus according to Claim 14,

wherein the lower-level N-gram language model generation and accumulation unit generates the lower-level N-gram language model by associating each N-long chain of words constituting the word string class with a probability at which the each chain of words occurs, and

the speech recognition apparatus comprises

a word string hypothesis generation unit operable to evaluate a word string hypothesis by multiplying each probability at which the each sequence of N words inside the word string class occurs.

26. **(Currently Amended)** A language model generation method for generating language models for speech recognition, comprising:

a higher-level N-gram language model generation and accumulation step for generating

and accumulating a higher-lever N-gram language model that is obtained by modeling each of a plurality of texts as a sequence of words that includes a word string class indicating a linguistic property of a word string constituting two or more words; and

a lower-level N-gram language model generation and accumulation step for generating and accumulating a lower-level N-gram language model that is obtained by modeling a sequence of two or more words within the word string class, ~~class.~~

wherein the word string class further includes a virtual word denoting a beginning of the word string class and a virtual word denoting an end of the word string class.

27. **(Currently Amended)** A speech recognition method for recognizing a speech which is a sequence of uttered words, using the following:

a higher-level N-gram language model that is obtained by modeling each of a plurality of texts as a sequence of words that includes a word string class indicating a linguistic property of a word string constituting two or more words; and

a lower-level N-gram language model that is obtained by modeling a sequence of two or more words within the word string class, ~~class.~~

wherein the word string class further includes a virtual word denoting a beginning of the word string class and a virtual word denoting an end of the word string class.

28. **(Previously Presented)** The speech recognition method according to Claim 27, further comprising

a step of categorizing each word string having a specific linguistic property as a word string class, and providing, to the each word string, a language likelihood which is a logarithm value of a probability, by use of class dependent word N-grams that are obtained by modeling the word string class in dependency on the word string class based on a linguistic relationship between words constituting the word string class;

a step of analyzing a text into a word and the word string class, and providing, to a sequence of the word and the word string class, a language likelihood which is alogarithm value

of a probability, by use of class N-grams that are obtained by modeling the sequence of the word and the word string class based on a linguistic relationship; and

a step of (i) comparing features parameters extracted from a series of speeches with a pronunciation as well as an acoustic characteristic of each word and generating a set of word hypotheses including an utterance segment of the each word and an acoustic likelihood of the each word, (ii) generating a word string hypothesis from the set of word string hypotheses with reference to the class N-grams and the class dependent word N-grams, and (iii) outputting a result of the speech recognition.

29. **(Currently Amended)** A program for performing a language model generation method that is intended for generating a language model for speech recognition, the program causing a computer to execute the following steps:

a higher-level N-gram language model generation and accumulation step for generating and accumulating a ~~higher-lever~~ high-level N-gram language model that is obtained by modeling each of a plurality of texts as a sequence of words that includes a word string class indicating a linguistic property of a word string constituting two or more words; and

a lower-level N-gram language model generation and accumulation step for generating and accumulating a lower-level N-gram language model that is obtained by modeling a sequence of two or more words within the word string class, ~~class.~~

wherein the word string class further includes a virtual word denoting a beginning of the word string class and a virtual word denoting an end of the word string class.

30. **(Currently Amended)** A program for performing a speech recognition method that is intended for recognizing a sequence of uttered words, the program causing a computer to execute a speech recognition step that is performed by use of the following:

a higher-level N-gram language model that is obtained by modeling each of a plurality of texts as a sequence of words that includes a word string class indicating a linguistic property of a word string constituting two or more words; and

a lower-level N-gram language model that is obtained by modeling a sequence of two or more words within the word string class. ~~class.~~

wherein the word string class further includes a virtual word denoting a beginning of the word string class and a virtual word denoting an end of the word string class.

31. **(Previously Presented)** The language model generation and accumulation apparatus according to claim 1, wherein the lower-level N-gram language model generation and accumulation unit is operable to represent a first sequence of words having a common linguistic property as the word string class, to generate and to accumulate, for each word string class, the lower-level N-gram language model that is obtained by modeling the first sequence of words included in the word string class; and

the higher-level N-gram language model generation and accumulation unit is operable to replace the first sequence of words modeled in the lower-level N-grams language model included in a text which is the sequence of words with a word string class corresponding to the first sequence of word, and to generate and to accumulate a higher-lever N-gram language model that is obtained by modeling the text which is the character string as a sequence of words that includes the word string class and a second sequence of words,

each word included in the first sequence of words and each word included in the second sequence of words are respectively morphemes which are smallest linguistic units that have meaning, and

the lower-level N-gram language model generation and accumulation unit is operable to generate and accumulate, for each word string class, the first sequence of words having the linguistic property indicated by the word string class.

32. **(New)** The speech recognition apparatus according to Claim 13,

wherein in the speech recognition,

an alignment of words is recognized from an input speech, by referring to a recognition dictionary which describes pronunciation of the words,

a sequence of words including the word string class is assumed in the alignment of words, and

the input speech is recognized based on (i) a probability that the words including the word string class appear in an order of appearance in the assumed sequence of words and (ii) a probability of an appearance of the words or the virtual word denoting the end of the word string class in an order of appearance in the word string class.

33. **(New)** The speech recognition apparatus according to Claim 14,

wherein, in the speech recognized from an input speech,

an alignment of words is recognized from a input speech, by referring to a recognition dictionary which describes pronunciation of the words,

a sequence of words including the word string class is assumed in the alignment of words, and

the input speech is recognized based on (i) a probability that the words including the word string class appear in an order of appearance in the assumed sequence of words and (ii) a probability of an appearance of the words or the virtual word denoting the end of the word string class in an order of appearance in the word string class.

34. **(New)** The speech recognition method according to Claim 27,

wherein in the speech recognition,

an alignment of words is recognized from an input speech, by referring to a recognition dictionary which describes pronunciation of the words,

a sequence of words including the word string class is assumed in the alignment of words, and

the input speech is recognized based on (i) a probability that the words including the word string class appear in an order of appearance in the assumed sequence of the words and (ii) a probability of an appearance of the words or the virtual word denoting the end of the word string class in order of appearance in the word string class.

35. **(New)** The program according to Claim 30,

wherein in the speech recognition step,

an alignment of words is recognized from an input speech, by referring to a recognition dictionary which describes pronunciation of the words,

a sequence of words including the word string class is assumed in the alignment of words, and

the input speech is recognized based on (i) a probability that the words including the word string class appear in an order of appearance in the assumed sequence of words and (ii) a probability of an appearance of the words or the virtual word denoting the end of the word string in an order of appearance in the word string class.